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REPORT ON
POLLUTION FROM MAJOR MUNICIPAL WASTE SOURCES
IN
DADE COUNTY, FLORIDA

Prepared by
ENVIRONMENTAL PROTECTION AGENCY
WATER QUALITY OFFICE
DIVISION OF FIELD INVESTIGATIONS
DENVER, COLORADO

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I. INTRODUCTION

On October 22, 1970, the Dade County Enforcement Conference was held, with representation by the State of Florida and the FWQA. The conclusions and recommendations of the conference which are pertinent to a discussion of major municipal waste sources were:

1. That there is pollution of the navigable waters in and adjacent to Dade County, Florida, that this pollution endangers the health and welfare of persons, and is subject to abatement under the Federal Water Pollution Control Act.
2. That this pollution is caused by discharges from numerous municipal, domestic, and industrial sources within Dade County.
3. That a minimum of secondary treatment, with at least 90 percent BOD removal and year-round chlorination of the effluent, should be provided for all wastes, as required by the State of Florida, before discharge to the ocean. This should be accomplished as rapidly as possible, but not later than January 1, 1974.
4. That all new construction be connected to adequate sewage collection and treatment systems.
5. That additional waste discharges to Lower Biscayne Bay, including Biscayne National Monument and its tributaries, be prohibited.
6. That an inventory of municipal and industrial wastes sources within Dade County, Florida, be initiated immediately by the

Federal Water Quality Administration, in cooperation with the State of Florida and local officials, and that a report be made to the Conferees by April 1, 1971.

This report summarizes information gathered during the inventory of major municipal waste sources within Dade County; evaluates the results of chemical and field sampling of both influent and effluent from these waste sources, with respect to removal efficiencies; and recommends certain actions which will lead to the abatement of pollution of the waters of Dade County by these major municipal waste sources.

Specific objectives of the survey were as follows:

1. To obtain an up-to-date inventory of major municipal waste treatment facilities within Dade County.
2. To evaluate these treatment facilities to determine their capabilities for at least 90 percent removal of wastes.
3. To present recommendations for improvement in operation of these treatment facilities.

Twenty-seven plants were surveyed during the periods November 28, 1970 to December 20, 1970 and January 3, 1971 to February 3, 1971. The location of the plants is shown in Figure 1. These plants serve a population of approximately 702,000 with a total flow of 64.3 MGD. The remainder of the County is served by either individual septic tanks or by connection to the North Miami and Miami Beach ocean outfalls. A total of approximately 37 MGD of untreated wastes is discharged through the two ocean outfalls. The exact population served by each is undetermined since sewer systems are under construction and flow through the ocean outfalls is increasing rapidly.

Removal efficiencies, based on 24-hour composites, were calculated for various waste related chemical parameters and effluent samples were analyzed for nitrogen compounds, total phosphorus, and chlorides. Grab samples of the effluent were collected and analyzed for chlorine residual, pH, and total and fecal coliform.

Representatives of the State of Florida Air and Water Pollution Control Agency and Dade County Pollution Control participated with the Division of Field Investigations - Denver Center, and the Lower Florida Estuary Study, Environmental Protection Agency, in the conduct of the waste source survey. Laboratory assistance was provided by the Division of Field Investigations - Cincinnati Center.

II. SUMMARY AND CONCLUSIONS

Sixteen of the 27 wastewater treatment facilities surveyed employ some form of the activated sludge process as secondary treatment, five plants have trickling filter systems, and the remainder have combinations of activated sludge and trickling filters. Three treatment plants use microstrainers to provide additional treatment after conventional secondary treatment, two plants employ "Jetflo" tertiary systems, and three plants have oxidation lagoons following mechanical treatment. The plants employing an activated sludge process generally provided the higher degree of treatment.

Eleven plants, or 41 percent of the total, provided in excess of 90 percent removal of BOD, five plants provided removals in the range of 85 to 90 percent, and six plants were in the range of 80 to 85 percent. The remainder, 19 percent, provided removals less than 80 percent. Six plants, or 22 percent, removed more than 90 percent of total suspended solids, eight plants removed from 85 to 90 percent, and three plants removed from 80 to 85 percent suspended solids. The remainder, 36 percent, provided less than 80 percent removal. One plant removed more than 90 percent of the total organic carbon, and six plants provided removals ranging from 85 to 90 percent.

Five plants, or 19 percent of those surveyed, provided removals greater than 90 percent for both biochemical oxygen demand and suspended solids. These plants were: Myrtle Grove, Palm Springs North Subdivision, Seaboard Industrial Park, South Dade Farm Labor Camp, and Redlands

Farm Labor Camp. These plants discharge approximately 2 percent of the total municipal wastewater and approximately 10 percent of the discharge to inland surface waters. Thus, 98 percent of the municipal wastewater receives inadequate or no treatment.

In the northern area of Dade County, major municipal wastes contribute a total flow of approximately 7 MGD, which is 30 percent of the total flow to inland waters, and a daily loading of 1,153 pounds biochemical oxygen demand and 3,429 pounds suspended solids to the Snake Creek and its tributaries. The daily pollutional load to the Miami River, from major municipal waste sources, was only 75 pounds of biochemical oxygen demand and 135 pounds suspended solids, and the sources contributed less than one percent of the total flow to inland waters in Dade County. These low pollutional loads and flows to the Miami River are not considered significant.

In the southern area of the county, major municipal waste sources contribute significant daily pollutional loads and flows to the following drainages:

1. Coral Gables Waterway, 260 pounds biochemical oxygen demand and 570 pounds suspended solids, with a flow of 2.6 MGD.
2. Snapper Creek, 1,300 pounds biochemical oxygen demand and 2,300 pounds suspended solids, with a flow of 5.9 MGD.
3. Black Creek, 860 pounds biochemical oxygen demand and 2,300 pounds suspended solids, with a flow of 3.7 MGD.
4. South Bay, 580 pounds biochemical oxygen demand and 950 pounds suspended solids, with a flow of 3.5 MGD.

The Carol City, Myrtle Grove, Community Utilities, and the Miami Lakes Utilities wastewater treatment plants are scheduled to be closed during 1971. Present waste flows from these plants, except Community Utilities which will discharge to the Virginia Key plant, are to be discharged, without treatment, to ocean outfalls. The closing of these plants is inconsistent with the conference recommendation that secondary treatment with a minimum of 90 percent BOD removal be provided all wastewater prior to discharge into the ocean.

III. RECOMMENDATIONS

To abate the existing pollution of the inland waters of Dade County and of the Atlantic Ocean by major municipal waste sources, the following actions are recommended:

1. That a regional treatment system be developed for the urban area of Dade County, which would insure secondary treatment of all domestic wastes, with removal efficiencies not less than 90 percent, and with disposal of treated effluents to the ocean.
2. That all wastes being discharged from the North Miami and the Miami Beach Ocean Outfalls be given secondary treatment, with at least 90 percent removal of BOD and suspended solids.
3. That the present plan to abandon the Carol City, Myrtle Grove, and the Miami Lakes Utilities wastewater treatment plants, with subsequent discharge, without treatment, to ocean outfalls, not be allowed until secondary treatment is provided to all ocean discharges.
4. That the City of Miami Virginia Key plant be upgraded to accomplish a minimum of 90 percent removal of BOD and suspended solids.

IV. POLLUTION FROM MAJOR MUNICIPAL WASTE SOURCES

Twenty-seven major municipal waste treatment facilities and two ocean outfalls were surveyed during the periods November 28 to December 20, 1970, and January 3 to February 2, 1971. Average flows ranged from 0.024 MGD to 47.0 MGD. The location of each plant is shown in Figure 1. For the waste treatment facilities, removal efficiencies, based on five 24-hour composites, were calculated for 5-day biochemical oxygen demand (BOD), chemical oxygen demand (COD), total suspended solids (TSS), volatile suspended solids (VSS), total organic carbon (TOC), and settleable solids (SS). In addition, the effluent samples were analyzed for nitrogen compounds, total phosphorus, and chlorides. Grab samples of the effluent were collected and analyzed for chlorine residual, pH, and total and fecal coliform.

The 24-hour composites were collected using either Serco automatic samplers or Sirco electric samplers. The Serco sampler collected approximately 400 ml of sample hourly over a 24-hour period. A 200 ml aliquot from each individual sample made up the 24-hour composite sample. The Sirco electric sampler collected a 100 ml sample every 30 minutes and deposited this aliquot in a 2-gallon bucket which was emplaced in ice. Field measurements of pH and temperature were taken of both influent and effluent grab samples at the time that the automatic samplers were serviced. Grab samples of the effluent were utilized to determine chlorine residual as well as total and fecal coliform.

Each plant was inventoried and evaluated for performance. Design information was provided by the plant management. Where possible, laboratory results were discussed with plant operators to determine the reason for any discrepancies in removal efficiences and to compare data collected during the survey with data collected routinely by the plant operators. An evaluation report was prepared for each waste source surveyed.

An inventory of the municipal waste sources surveyed including a statement of pollution abatement needs, is given in Table 1. Five of the plants surveyed were operating satisfactorily. Six plants were hydraulically overloaded, but the removal efficiencies appeared to be affected in only three of these plants. Flow meters malfunctioned in six of the plants surveyed (inaccurate, incorrect placement, etc.); seven plants did not provide adequate chlorination; and five required addition or enlargement of treatment facilities.

Appendix A (Tables A-1 through A-5) provides detailed information on average influent and effluent concentrations, removal efficiencies, and loads for the various parameters measured during the survey. Table 2 summarizes the total load contributed by the waste sources to each major drainage area. A discussion of significant probems associated with the individual waste sources, in each drainage area, follows:

A. Snake Creek Drainage

Daily BOD removal efficiencies at the Carol City wastewater treatment plant varied from 73.5 to greater than 97.3 percent, and

suspended solids efficiencies varied from 61.3 to 91.5 percent. At the time of the survey, it was standard procedure to operate only three of four mechanical aerators in each aeration tank. Prechlorination of the influent was also practiced during part of the survey. After the survey plant officials performed an inplant analysis which indicated sufficient dissolved oxygen could not be provided by operating only three mechanical aerators and that there was inadequate settling in the secondary clarifiers. To solve these problems, four mechanical aerators are now operating in each aeration tank, and alum is introduced prior to flow into the secondary clarifiers.

The Myrtle Grove wastewater treatment plant provide BOD and suspended solids removals in excess of 90 percent. This plant receives an estimated 0.25 MGD of industrial waste. These industrial wastes include discharges from plating operations, milk processing, and dye processing. The plant has received industrial "slugs" which have interferred with the treatment. No difficulties of this type were experienced during the survey. The influent was discolored on several occasions, i.e. green, red, black, etc. indicating the presence of dye. However, this resulted in no apparent problems in treatment.

An industrial waste survey was conducted under private contract of industries discharging to the plant. The report on that survey was not available to the EPA staff at the time of this municipal waste source evaluation. Table 3 lists some of the major industries discharging to the Myrtle Grove plant. These industries were visited during the recent industrial waste source survey conducted by the EPA.

Table 3.--Major Industrial Wastewater Discharges to the Myrtle Grove Wastewater Treatment Plant

Industry	Products or Processes	Water Use[1/] Gallons per Month
Aluminine, Inc.	Aluminum grills	184,000
Anodyne	Lithograph and silk screens	930,000
Atlas Metal Industry, Inc.	Computer and Food Processing Equipment	808,000
Miller Industry, Inc.	Aluminum sliding doors, grills, etc.	325,000
Perkins Marine Lamp & Hardware Corp.	Marine Hardware	1,379,000
Sealtest Food Products	Dairy Products	3,087,000
Velda Farms	Dairy Products	-

1/ Water use figures supplied by the North Miami Beach Utilities, Water Department.

The Golden Isles waste treatment plant provided 82 percent and 80 percent removal of BOD and suspended solids, respectively. However, suspended solids removals were greater than 90 percent on four of the five days of the survey. On the one day when removals were low, a malfunction in the pumping station caused a surge in the influent flow and subsequent solids overflow into the effluent. The primary problem at this plant is hydraulic and organic overloading, which cause the low BOD removal efficiency. The plant is designed for a daily flow of 0.500 MGD and an influent BOD loading of 850 pounds per day. During the survey, the average flow was approximately 0.65 MGD and the incoming BOD was approximately 1,000 pounds per day.

The Country Club of Miami wastewater treatment plant provided BOD and suspended solids removals of 95 and 85 percent, respectively, during the survey. A major portion of the suspended solids in the effluent can be atributed to the algae from the polishing pond. The BOD values in the effluent were low, averaging approximately 8 mg/l during the survey.

The Carol City and Myrtle Grove plants are scheduled to be abandoned in 1971, and the wastes are to be given preliminary treatment, then pumped through the North Miami ocean outfall. Preliminary treatment consists of allowing the wastewater to flow through a primary clasifier, removing skimmings, and recombining the settled sludge. This will reduce the flow of wastewater to the Snake Creek drainage by approximately 4 MGD, and will reduce the BOD loading by approximately 800 pounds per day, as well as providing similar reductions in other pollutants (see Appendix A). However, abandonment of these treament plants

is inconsistent with the Conference recommendation that a minimum of secondary treatment, with at least 90 percent BOD removal and year-round chlorination of effluent, be provided all waste before discharge to the ocean.

B. Biscayne Canal and Little River Drainage

The Miami Lakes Utilities wastewater treatment plant did not remove 90 percent of either BOD or suspended solids. During two days of the survey, there was no chlorine residual in the effluent. It was subsequently determined that the effluent from the Pickers X-ray Solution Corporation contained thiosulfate solution, which accounted for this absence in chlorine residual. This plant receives industrial wastes from the 21 industries located in the Miami Lakes Industrial Park. At the time of the survey, plant management had no assessment of the quality or quantity of these wastes. The following steps have since been taken to improve operations of the plant:

1. Additional operators have been hired.
2. Air lines have been cleared and blowers have been overhauled, to insure proper supply of air to each of the three individual plants in the system.
3. A contract has been let for a private laboratory to characterize and quantify waste from each industry within the industrial park.
4. Pickers X-ray Solution Corporation has begun a reclaiming operation which eliminates that drainage of thiosulfate solution into the sewer system.

This plant is to be abandoned and the present wastewater flow discharged to the North Miami outfall. This will reduce the daily waste loads to this drainage by 253 pounds BOD and 316 pounds suspended solids, and the flow by 0.7 MGD. As with the Carol City and Myrtle Grove plants, this proposed action is inconsistent with the Conference recommendation that a minimum of secondary treatment, with at least 90 percent BOD removal and year-round chlorination of effluent, be provided all wastes before discharge to the ocean.

C. Miami River Drainage

There are no significant municipal discharges to the Miami River drainage. The two plants surveyed discharged a total of 0.24 MGD during the survey. The Atomic Sewerage plant removed greater than 90 percent BOD, and 89 percent suspended solids, at an average flow of 0.024 MGD. The Doral Country Club removed 90.1 percent BOD, and 57.6 percent suspended solids. The low suspended solids removal was caused by other improper operation or design of the secondary clarifier.

D. Coral Gables Waterway Drainage

The Community Utilities Wastewater Treatment Plant contributes over 95 percent of the wastewater flow to this drainage, approximately 90 percent of the BOD and suspended solids, and approximately 85 percent of the total organic carbon loading. The Community Utilities plant is to be abandoned, with the present wastewater flowing to the Virginia Key plant.

E. Snapper Creek Drainage

The Peninsular Utilities plant removed 89.5 percent BOD and 88.9 percent suspended solids. In early 1971, the plant will initiate a deep-well injection system, which will reduce the total flow of wastewater to the Snapper Creek drainage by approximately 40 percent, the BOD loading by approximately 25 percent, and the suspended solids loading by 37 percent.

The low removal efficiencies experienced at the Southern Estates wastewater treatment plant during the survey, 76.1 percent removal of BOD and 69.7 percent removal of suspended solids, can be attributed to the extreme hydraulic overload, about 140 percent of design flow. This excess flow is attributed to infiltration, which is verified by the relatively low influent BOD concentration of 134 mg/l. The present problem can be corrected by expeditious elimination of infiltration, or by expansion of treatment facilities.

Removal efficiencies at the Westwood Lakes plant were 74 percent and 94.3 percent for BOD and suspended solids, respectively. Until immediately prior to the survey, the activitated sludge plant had been utilized as an aerobic digester, with all wastewater flow through the trickling filter. Because of the short period of time since startup, the treatment capability of the system was possibly below normal, thus resulting in low BOD removal.

F. Black Creek Drainage

The Cutler Ridge wastewater treatment plant removed 86.5 percent BOD and 73.8 percent suspended solids. The plant experienced mechanical

difficulties with a secondary clarifier on one day of the survey which reduced the average removal efficiencies.

The Bell Aire wastewater treatment plant is a trickling filter system with a microstrainer and sand filters as additional treatment. The plant removed 77.8 percent BOD and 89.5 percent suspended solids. Plans have been initiated to replace the system with an activated sludge unit, but these plans have been suspended pending clarification of State and local requirements for discharge of waste materials.

G. South Bay Drainage

The Homestead Air Force Base wastewater treatment plant is hydraulically overloaded. The plant is designed for the average flow of approximately 1.0 MGD, but receives approximately 2.5 MGD during winter months and approximately 3.0 MGD during summer months. BOD removal efficiences were low during the survey, based on an average influent BOD strength of 52 mg/l and an effluent strength of 18 mg/l, though this effluent strength is below that of many plants surveyed. The primary and secondary clarifiers are to be expanded and sand filters are to be added.

H. Direct Ocean Discharge

There are three major waste discharges directly into the ocean. The City of Miami Virginia Key plant discharges approximately 40 MGD of wastes, though designed for a flow of 47 MGD, of which approximately 80 percent of BOD and 90 percent suspended solids have been removed.

The plant is designed to remove only 75 percent of the BOD. If this plant is upgraded to provide 90 percent BOD removal, the present load discharged to the ocean would be reduced by approximately 11,000 pounds per day. The North Miami and Miami Beach ocean outfalls discharge approximately 15 and 22 MGD, respectively, of wastewater which receives "preliminary" treatment only. Ninety percent treatment of these waste discharges would reduce the BOD loading to the ocean by approximately 33,000 pounds per day. These discharges do not conform to the conference recommendation that all waste discharges receive 90 percent treatment prior to discharge into the ocean.

APPENDIX A

DATA ON INDIVIDUAL MUNICIPAL WASTE TREATMENT PLANTS IN DADE COUNTY, FLORIDA

Table A-1.--Average Efficiences and Loadings for Individual Municipal Waste Sources, Dade County, Florida
Biochemical Oxygen Demand and Total Suspended Solids

Facility	Flow MGD	Biochemical Oxygen Demand				Total Suspended Solids			
		Influent	Effluent	Percent removal	Load lb/day	Influent	Effluent	Percent removal	Load lb/day
Snake Creek Drainage									
Andover	1.714	164	20	84.0	309	135	17	83.0	200
Carol City	2.030	164	31	82.5	520	146	56	71.2	96
Riverdale Estates	0.362	456	66	85.6	190	369	249	32.6	769
Golden Isles	0.642	182	32	82.4	172	182	31	79.9	166
Myrtle Grove-City of North Miami	1.645	250	21	91.8	289	394	24	93.8	330
Country Club of Miami	0.185	138	4	94.5	6	102	13	85.0	20
Palm Springs North S.D.	0.447	265	18	92.8	67	922	9	98.6	34
Biscayne Canal and Little River Canal Drainage									
Miami Lakes Utilites	0.727	233	42	79.8	253	172	72	70.9	316
Seaboard Industrial Park	0.117	788	32	95.0	31	866	27	95.2	26
Opa Locka Airport-Dade County Port Authority	0.183	187	34	82	60	129	16	87	24
Miami River Drainage									
Atomic Sewerage	0.024	1,126	106	89.9	22	1,348	124	89.0	27
Doral Country Club	0.215	295	28	90.1	53	218	54	57.6	108
Coral Gables Waterway									
Lil' Abner Trailer Park	0.072	402	52	84.1	32	350	80	79.1	52
Pan American Hospital	0.036	209	5	97.8	2	248	65	60.1	20
Community Utilities	2.471	211	12	94.4	230	200	24	87.5	499
Snapper Creek Drainage									
Peninsular Utilites	2.500	230	24	89.5	502	365	41	88.9	847
Southern Estates	1.428	134	31	76.1	373	166	50	69.7	588
Westwood Lakes	1.970	227	57	74.0	939	798	52	94.3	856

Table A-1.--Average Efficiences and Loadings for Individual Municipal Waste Sources, Dade County Florida
Biochemical Oxygen Demand and Total Suspended Solids--Continued

Facility	Flow MGD	Biochemical Oxygen Demand				Total Suspended Solids			
		Influent	Effluent	Percent removal	Load lb/day	Influent	Effluent	Percent removal	Load lb/day
Black Creek Drainage									
South Miami Heights	1.089	507	34	92.2	306	958	83	85.1	751
Cutler Ridge	2.195	209	21	86.5	479	374	78	73.8	1,473
Bell Aire S.D.[1/]	0.423	233	51	77.8	180	285	28	89.5	99
South Bay Drainage									
Homestead Air Force Base	2.116	52	18	63.7	318	69	38	76.0	631
City of Homestead	0.893	174	31	82.7	222	258	42	84.7	306
South Dade Labor Camp	0.126	500	33	93.9	35	785	10	98.7	11
Redland Labor Camp[2/]	0.057	479	18	90.6	23	679	34	90.6	43
Leisure City[2/]	0.296	238	31	86.8	76	437	73	81.2	175
Atlantic Ocean									
Virginia Key-City of Miami	40.3	311	64	79.3	21,640	654	75	88.4	2,445
North Miami	13.5	64	-	-	722	115	-	-	12,978
Sunny Isles	1.5	144	-	-	1,804	91	-	-	1,140
Miami Beach	21.8	165	-	-	29,998	176	-	-	31,998

1/ Contributes 40 percent of load surface water, 60 percent to ground water.
2/ Ground water discharge.

Table A-2.--Average Efficiencies and Loadings for Individual Municipal Waste Sources, Dade County, Florida
Chemical Oxygen Demand and Total Organic Load

Facility	Flow MGD	Chemical Oxygen Demand				Total Organic Carbon			
		Influent	Effluent	Percent removal	Load lb/day	Influent	Effluent	Percent removal	Load lb/day
Snake Creek Drainage									
Andover	1.714	483	77	87.0	813	82	17	82.4	219
Carol City	2.030	516	121	78.4	2,047	97	37	49.1	621
Riverdale Estates	0.362	1,001	261	73.4	773	197	52	73.0	154
Golden Isles	0.642	545	103	80.4	553	112	25	77.7	134
Myrtle Grove-City of North Miami	1.645	537	83	32.3	1,141	149	33	77.9	454
Country Club of Miami	0.185	434	45	88.4	70	89	19	78.8	29
Palm Springs North S.D.	0.447	890	87	89.1	325	212	26	87.7	97
Biscayne Canal and Little River Canal Drainage									
Miami Lakes Utilities	0.727	559	388	41.1	2,327	116	65	66.3	390
Seaboard Industrial Park-City of Miami	0.117	2,098	193	38.8	189	530	42	89.5	41
Opa Locka Airport-Dade County Port Authority	0.183	972	74	92	113	72	20	73	30
Miami River Drainage									
Atomic Sewerage	0.024	9,179	467	88.4	98	990	99	87.4	21
Doral Country Club	0.215	776	173	77.5	318	155	56	63.9	93
Coral Gables Waterway									
Lil' Abner Trailer Park	0.072	831	472	49.1	319	207	77	57.2	47
Pan American Hospital	0.036	631	48	92.2	14	122	14	88.3	4
Community Utilities	2.471	660	45	92.9	937	153	15	89.7	301

Table A-2.--Average Efficiencies and Loadings for Individual Municipal Waste Sources, Dade County, Florida--Continued
Chemical Oxygen Demand and Total Organic Load

Facility	Flow MGD	Chemical Oxygen Demand				Total Organic Carbon			
		Influent	Effluent	Percent removal	Load lb/day	Influent	Effluent	Percent removal	Load lb/day
Snapper Creek Drainage									
Peninsular Utilities	2.500	679	79	86.9	1,656	142	20	85.3	406
Southern Estates	1.428	501	106	78.0	1,253	96	31	67.6	362
Westwood Lakes	1.970	556	164	70.5	2,701	128	58	52.4	955
Black Creek Drainage									
South Miami Heights	1.089	2,051	95	95.0	854	264	11	84.4	272
Cutler Ridge	2.195	714	66	90.5	1,219	116	29	73.0	533
Bell-Aire S.D.[1/]	0.423	605	151	71.9	534	126	39	69.0	137
South Bay Drainage									
Homestead Air Force Base	2.116	446	60	84.1	1,045	44	18	56.7	309
City of Homestead	0.893	368	99	73.5	714	106	43	56.8	304
South Dake Labor Camp	0.126	3,069	227	92.9	239	335	18	94.6	19
Redlands Labor Camp[2/]	0.057	1,016	63	89.5	79	234	17	84.2	22
Leisure City[2/]	0.296	785	93	87.1	233	163	32	80.8	80
Atlantic Ocean									
Virginia Keys-City of Miami	40.3	791	172	77.9	57,580	239	50	78.4	16,720
North Miami	13.5	540	-	-	60,938	42	-	-	4,740
Sunny Isles	1.5	560	-	-	7,018	97	-	-	1,216
Miami Beach	21.8	522	-	-	94,905	70	-	-	12,726

1/ Contributes 40 percent to surface water, 60 percent to ground water
2/ Ground water discharge.

Table A-3.--Average Efficiences and Loadings for Individual Municipal Waste Sources, Dade County, Florida--Volatile Suspended Solids and Settleable Solids

Facility	Flow MGD	Volatile Suspended Solids				Settleable Solids	
		Influent	Effluent	Percent removal	Load lb/day	Influent	Effluent
Snake Creek Drainage							
Andover	1.714	119	12	70.0	209	9	0.1
Carol City	2.030	106	42	63.7	713	11	0.2
Riverdale Estates	0.362	425	162	60.0	468	27	4.0
Golden Isles	0.642	157	28	79.4	150	10	1.0
Myrtle Grove-City of North Miami	1.645	334	21	93.6	289	8.5	.1
Country Club of Miami	0.185	84	11	83.3	17	7	0.1
Palm Springs North S.D.	0.447	870	6	99.3	22	35	.1
Biscayne Canal and Little River Canal Drainage							
Miami Lakes Utilities	0.727	132	29	77.2	175	8	1.2
Seaboard Industrial Park	0.117	783	21	96.0	21	18	.1
Opa Locka Airport-Dade County Port Authority	0.183	99	12	88	18	4	.3
Miami River Drainage							
Atomic Sewerage	0.024	1,235	73	92.5	15	32	0.08
Doral Country Club	0.215	122	46	26.0	86	12	0.34
Coral Gables Waterway							
Lil' Abner Trailer Park	0.072	212	32	80.2	25	14	0.8
Pan American Hospital	0.036	134	29	53.8	8.7	15	0.1
Community Utilities	2.471	170	21	87.4	420	19	0.1
Snapper Creek Drainage							
Peninsular Utilities	2.500	344	34	90.6	701	7.5	0.1
Southern Estates	1.428	138	40	70.8	472	5	0.1
Westwood Lakes	1.970	743	47	93.7	774	13	0.3

Table A-3.--Average Efficiences and Loadings for Individual Municipal Waste Sources, Dade County, Florida--Volatile Suspended Solids and Settleable Solids--Continued

Facility	Flow MGD	Volatile Suspended Solids				Settleable Solids	
		Influent	Effluent	Percent removal	Load lb/day	Influent	Effluent
Black Creek Drainage							
South Miami Heights	1.089	923	75	85.0	668	19	0.1
Cutler Ridge	2.195	342	69	73.6	1,293	7	0.1
Bell Aire S.D.[1/]	0.423	250	23	94.6	81	9	0.1
South Bay Drainage							
Homestead Air Force Base	2.116	65	8.3	86.0	149	3	0.2
City of Homestead	0.893	181	34	82.3	248	8	0.1
South Dade Labor Camp	0.126	731	6	99.2	6	2	0.1
Redlands Labor Camp[2/]	0.057	652	28	91.9	35	9	0.5
Leisure City[2/]	0.296	413	71	81.7	169	9	0.2
Atlantic Ocean							
Virginia Key-City of Miami	40.3	580	61	89.8	19,100	10	0.1
North Miami	13.5	96	-	-	10,833	1.5	-
Sunny Isles	1.5	79	-	-	990	2	-
Miami Beach	21.8	130	-	-	23,635	8	-

1/ Contributes 40 percent to surface water, 60 percent to ground water.
2/ Ground water discharge.

Table A-4.--Average Concentrations and Loadings for Individual Municipal Waste Sources for Dade County, Florida
Nitrogen, Phosphorus and Chlorides

Facility	Flow MGD	Kjeldahl Nitrogen as N Effluent mg/l	Kjeldahl Nitrogen as N Load lb/day	Ammonia Nitrogen as N Effluent mg/l	Ammonia Nitrogen as N Load lb/day	Organic Nitrogen as N Effluent mg/l	Organic Nitrogen as N Load lb/day	NO_2+NO_3 as N Effluent mg/l	NO_2+NO_3 as N Load lb/day	Total Phosphorus as P Effluent mg/l	Total Phosphorus as P Load lb/day	Chloride mg/l
Snake Creek Drainage												
Andover	1.714	5.6	79	3.8	53	1.8	26	10.0	140	7.6	107	67
Carol City	2.030	21.8	368	17.4	296	4.3	73	2.2	37	9.0	154	36
Riverside Estates	0.362	11.0	31	1.9	6	9.0	25	16.0	46	16.4	50	43
Golden Isles	0.642	24.0	129	21.4	115	2.6	14	0.08	0.4	11.1	60	114
Hyrtle Grove-City of North Miami	1.645	25.6	352	23.3	320	2.3	32	0.01	0.1	10.8	149	69
Country Club of Miami	0.185	1.8	2.8	0.5	0.8	1.3	2	1.3	2.0	6.8	11	30
Palm Springs North S.D.	0.447	26.3	98	25	93	1.3	4	0.5	2.0	13.7	51	68
Biscayne Canal and Little River Canal Drainage												
Miami Lakes Utilities	0.727	18.0	109	13.9	84	4.1	25	1.7	10.0	13.0	80	75
Seaboard Industrial Park	0.117	3.1	3	4.7	5	3.7	4	0.05	0.05	6.6	7	62
Opa Locka Airport-Dade County Port Authority	0.183	4.8	7.3	1.88	2.9	N.D.	N.D.	25.0	38.2	9.2	14.1	192
Miami River Drainage												
Atomic Sewerage	0.024	19.0	4	8.0	2	11.0	2	0.3	0.1	7.5	2	116
Doral Country Club	0.215	10.8	19	5.0	9	5.8	10	1.3	3	6.7	13	55
Coral Gables Waterway												
Lil' Abner Trailer Park	0.072	26.7	16	19.5	12	7.2	4	0.6	0.1	15.2	9	79
Pan American Hospital	0.036	1.9	0.6	0.7	0.2	1.2	0.4	12.4	4	2.1	0.6	118
Community Utilities	2.471	15.3	315	14.5	300	0.8	16	4.4	90	7.2	149	46
Snapper Creek Drainage												
Peninsular Utilities	2.500	20.5	427	19.4	405	1.3	27	0.02	0.1	9.4	195	36
Southern Estates	1.428	13.5	161	11.4	135	2.2	26	0.9	10	8.7	104	45
Westwood Lakes	1.970	25.1	413	19.2	316	5.9	97	0.26	4	11.8	194	57

Table A-4.--Average Concentrations and Loadings for Individual Municipal Waste Sources for Dade County, Florida
Nitrogen, Phosphorus and Chlorides—Continued

Facility	Flow MGD	Kheldahl Nitrogen as N Effluent mg/l	Kheldahl Nitrogen as N Load lb/day	Ammonia Nitrogen as N Effluent mg/l	Ammonia Nitrogen as N Load lb/day	Organic Nitrogen as N Effluent mg/l	Organic Nitrogen as N Load lb/day	NO_2+NO_3 as N Effluent mg/l	NO_2+NO_3 as N Load lb/day	Total Phosphorus as P Effluent mg/l	Total Phosphorus as P Load lb/day	Chloride mg/l
Black Creek Drainage												
South Miami Heights	1.089	22.2	202	18.0	164	4.2	38	1.1	10	13.6	123	N.D.[3]
Cutler Ridge	2.195	9.3	172	7.4	135	2.0	37	0.9	18	10.0	185	69
Bell Aire S.D.[1]	0.423	24.1	85	19.9	70	4.2	15	0.8	3	10.2	36	40
South Bay Drainage												
Homestead Air Force Base	2.116	3.5	60	2.0	34	1.5	25	6.8	119	6.9	119	119
City of Homestead	0.893	14.4	104	11.3	82	3.1	22	5.7	42	13.6	98	72
South Dade Labor Camp	0.126	13.3	14	8.5	9	4.9	5	2.3	2	7.4	2	47
Redlands Labor Camp[2]	0.057	4.4	6	2.3	3	2.1	3	10.6	13	9.0	11	43
Leisure City[2]	0.296	43.4	107	13.1	33	30.3	75	0.7	2	19.8	49	53
Atlantic Ocean												
Virginia Key-City of Miami	40.3	19.0	6,392	14.1	4,744	5.1	1,716	0.06	20	8.6	2,890	1,048
North Miami	13.5	12.7	1,433	6.5	734	6.2	700	.013	1.5	4.6	519	
Sunny Isles	1.5	38.4	481	26.4	331	12.0	78	0.025	.3	8.0	100	1,353
Miami Beach	21.8	26.4	4,799	19.0	3,454	7.4	1,349	0.048	8	8.8	1,599	979

1/ Contributes 40 percent to surface water, 60 percent to ground water.
2/ Ground water discharge.
3/ No data.

Table A-5.--Median MPN and Average of Field Observations for Municipal Waste Source in Dade County, Florida

Facility	Flow MGD	Coliform Total MPN	Coliform Fecal MPN	Influent Temperature °C.	Influent pH S.U.	Effluent Temperature °C	Effluent pH S.U.	Effluent Chlorine Residual
Snake Creek Drainage								
Andover	1.714	20	18	26	7.6	24	6.8	2.0
Carol City	2.030	18	18	26	7.3	25	6.9	4.0
Riverdale Estates	0.362	18	18	26	7.5	23	4.6	6.8
Golden Isles	0.642	18	18	25	7.2	24	6.5	2.3
Myrtle Grove-City of North Miami	1.645	18	18	25	7.0	23	6.6	2.2
Country Club of Miami	0.185	20	18	24	6.5	23	6.5	1.0
Palm Springs North S.D.	0.447	18	18	25	7.2	23	6.7	1.8
Biscayne Canal and Little River Canal Drainage								
Miami Lakes Utilities	0.727	2,700,000	350,000	26	8.3	26	8.1	2.6
Seaboard Industrial Park	0.117			26	7.1	23	6.0	3.5
Opa Locka Airport-Dade County Port Authority	0.183			23	6.7	21	6.4	0
Miami River Drainage								
Atomic Sewerage	0.024	18	18	25	7.8	23	7.410	
Doral Country Club	0.215	20	20	29	6.8	28	6.8	4.2
Coral Gables Waterway								
Lil' Abner Trailer Park[1/]	0.072			25	7.8	22	6.6	N.D.
Pan American Hospital	0.036	18	18	29	7.3	25	5.7	3.4
Community Utilities	2.471	18	18	26	9.7	26	9.8	2.0
Snapper Creek Drainage								
Peninsular Utilities	2.500			26	8.3	25	8.1	4.4
Southern Estates	1.428	620	1,100	25	8.4	24	8.1	2.8
Westwood Lakes	1.970			24	7.8	23	6.7	2.5

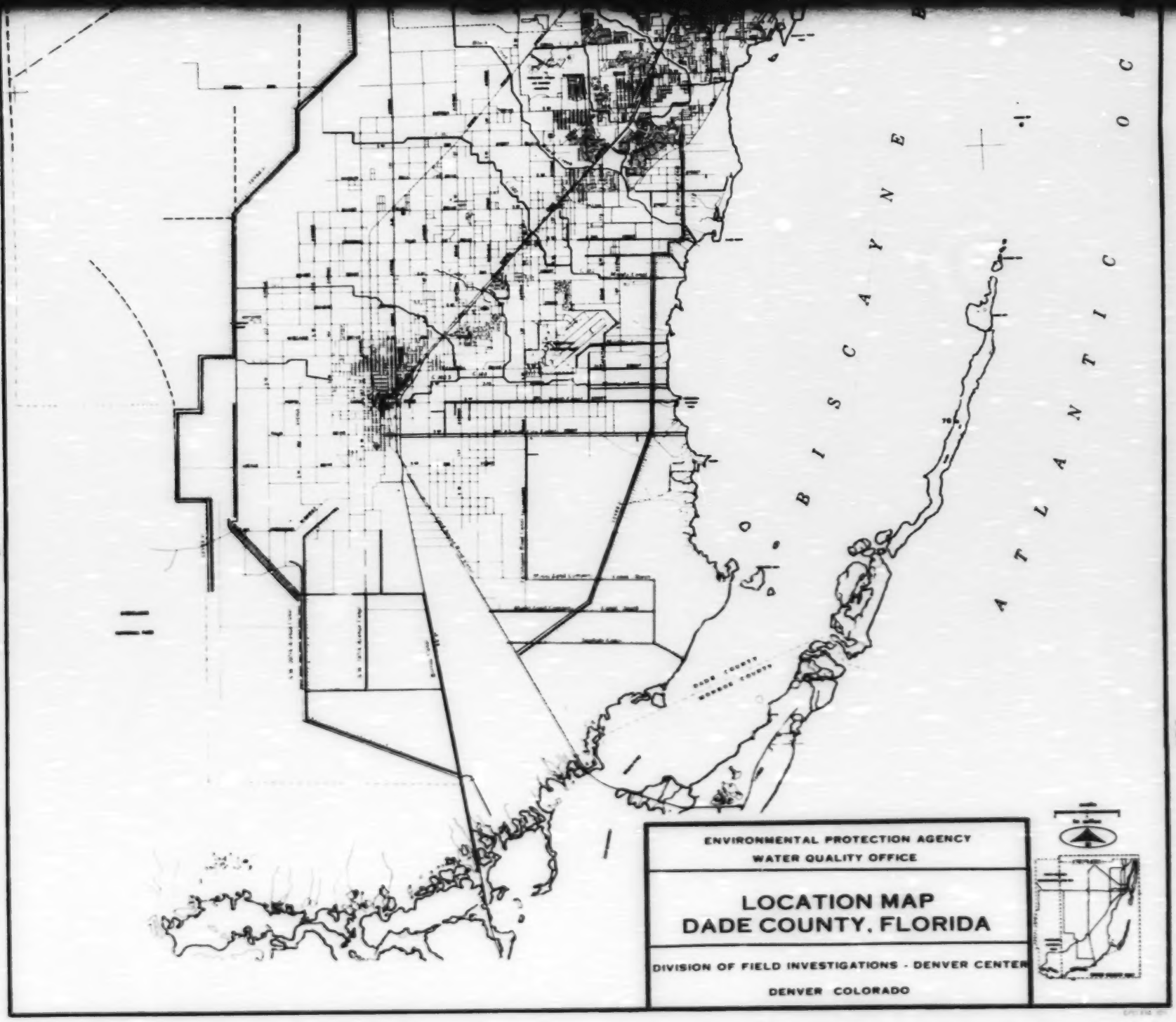
Table A-5.--Median MPN and Average of Field Observations for Municipal Waste Source in Dade County, Florida--Continued

Facility	Flow MGD	Coliform Total MPN	Coliform Fecal MPN	Influent Temperature °C	Influent pH S.U.	Effluent Temperature °C	Effluent pH S.U.	Effluent Chlorine Residual
Black Creek Drainage								
South Miami Heights	1.089	410	32	26	7.2	27	7.0	1.1
Cutler Ridge	2.195	18	18	27	7.1	27	7.0	1.8
Bell Aire S.D.[2/]	0.423			24	7.4	22	6.6	1.5
South Bay Drainage								
Homestead Air Force Base	2.116	170	45	25	7.2	25	6.9	.5
City of Homestead	0.893	490	93	26	7.7	26	7.4	2.2
South Dade Labor Camp	0.126			23	6.7	21	6.5	3.3
Redland Labor Camp[3/]	0.057	18	18	26	7.3	25	7.3	2.3
Leisure City[3/]	0.296	40	18					
Atlantic Ocean								
Virginia Key-City of Miami	40.3	1,300	78	28	6.8	28	6.8	0.4
North Miami	13.5	ND	ND	ND	ND	ND	ND	ND
Sunny Isles	1.5	ND	ND	ND	ND	ND	ND	ND
Miami Beach	21.8	ND	ND	ND	ND	ND	ND	ND

1/ Single sample.
2/ Contributes 40 percent to surface water, 60 percent to ground water.
3/ Ground water discharge.
ND Not determined.

GPO 834-301

OCEAN
BAY
MEDLEY
OPA LOCKA AIRPORT
HIALEAH - MIAMI SPRINGS WELL FIELD
MIAMI INTERNATIONAL AIRPORT


BISCAYNE
ATLANTIC OC
DADE COUNTY
MONROE COUNTY
ENVIRONMENTAL PROTECTION AGENCY
WATER QUALITY OFFICE
LOCATION MAP
DADE COUNTY, FLORIDA
DIVISION OF FIELD INVESTIGATIONS - DENVER CENTER
DENVER COLORADO